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54 **Package for the controlled ripening of produce and fruits.**

57 A flexible, semi-rigid or rigid plastics material container, bag or encasement for produce, characterised in that said container, bag or encasement has a selected size and number of openings therein, whereby the modified atmosphere (as herein defined) within the container, bag or encasement is controlled, thereby allowing the ripening of the produce, when located within the container, bag or encasement, to be delayed.

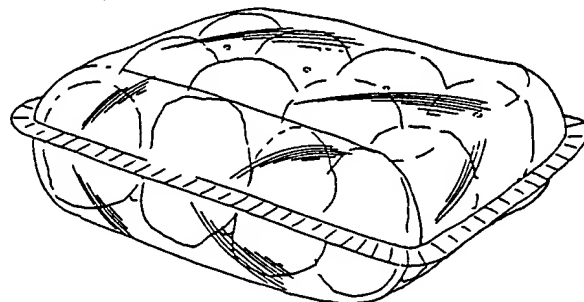


FIG.1

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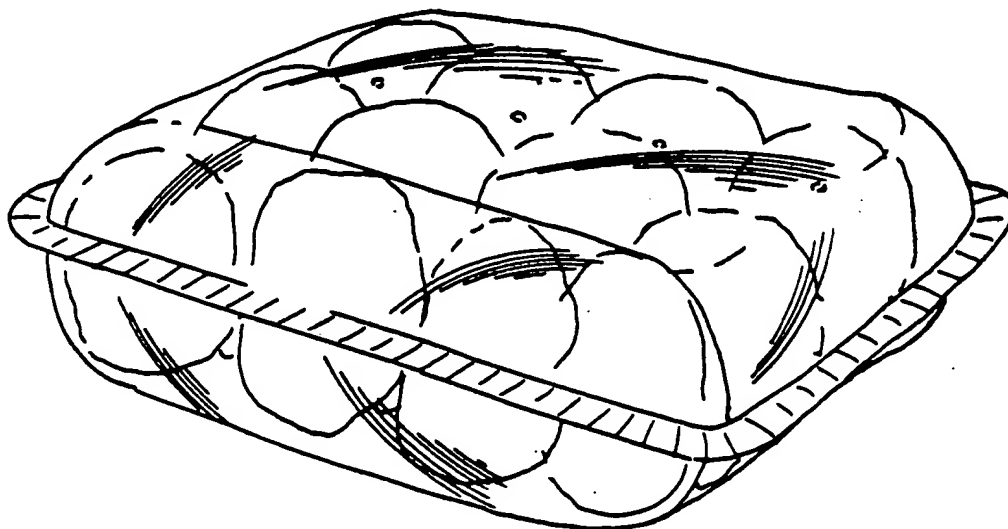


FIG.1

provide excess openings, suitably in the form of micro perforations over the container, bag or encasement, then the desired modified atmosphere within the container, bag or encasement will not be achieved.

If insufficient opening(s) were provided in the container, bag or encasement then the enclosed product would overmodify the internal atmosphere of the pack to cause irreparable damage to the produce container therein.

In accordance with an embodiment of the invention there is provided a plastics material stretch film which has been micro perforated, the number and size of said micro perforations being selected for the particular product to be packaged therein, to produce a controlled modified atmosphere.

It is preferable with the small number of openings necessary in the majority of retail packs that they should be placed in such positions in said packs as to eliminate the possibility of product within the packs blocking the micro perforations or openings, thus reducing or totally destroying the performance of said packs.

In one known procedure, stretch film is used in the packaging of fresh produce. However, problems occur in relation to insufficient film permeability causing undue condensation. For example, very high respiration products such as mushrooms, when packed in a film overwrapped punnet, do have very heavy pack condensation problems. For this and other reasons, the film is generally spiked in an attempt to ventilate the product. Whilst such action will generally cure the problem of condensation due to its relatively crude nature, other problems occur such as dehydration and subsequent weight loss and reduction of visual appeal to the potential customer. When micro perforation pattern, utilising the arrangement no. of lines/distance lines apart (mm)/pitch of pins (mm)/size of holes (mm) 05/20/30/60 was used on PVC stretch film overwrapped punnets not only was the weight loss of the mushrooms significantly reduced, the mushrooms would keep for periods of up to six days longer than spiked packs before going brown.

Another interesting case is that of packaging iceberg lettuce. Severe weight loss by dehydration has been observed when such lettuce are wrapped in large holed perforated polypropalene. On the other hand, high amounts of condensation have been noted when the product has been packed in plain PVC stretch film. This was the basis, some years ago of the theory that iceberg lettuce was going prematurely brown when wrapped in PVC film; however, it was not the film causing the problem at all but the trapped condensation. Tests carried out using micro perforated stretch film micro perforated to pattern 11/25/50/60 gave up to seven extra days life to the lettuce compared with the larger holed polypropalene wrapping.

Sweetcorn is one of the highest respiration products known and not to wrap or pack causes high dehydration and weight loss, by packing in a tray and overwrapping the tray with PVC stretch film micro perforated to 05/20/30/60 the sweetcorn although modifying the internal atmosphere of the pack very quickly the micro perforation allowed a slowing of the ripening with less weight loss than previously experienced. When packed in plain PVC film overwrapped packs the sweetcorn overmodified the internal atmosphere of the pack within 60 minutes causing very unpleasant odours (alcoholic) to occur and the product was totally uneatable.

If the packaging is given too much ventilation, as with ventilated polyethylene bags, net sacks, perforated snap on plastic lids and too highly perforated polypropalene film, etc., problems with weight loss due to dehydration will occur. Some products can lose a great proportion of their weight through dehydration, as previously mentioned mushrooms are a case in point, brussel sprouts too are a problem product, but weight loss does apply to all produce and fruits.

In an attempt to indicate further advantages achieved by utilising films in accordance with the present invention, tests were carried out on brussel sprouts. In this connection a standard net bag was compared with a plastic punnet overwrapped with PVC stretch film micro perforated to pattern 11/25/50/60. The results obtained are as follows.

	<u>Micro perforated punnet pack</u>	<u>net bag</u>
Weight loss after one week	1%	13%
Weight loss after two weeks	2%	30%

It will thus be seen that if a net pack were utilised then one must allow for a minimum of 13% extra product per bag to overcome weight loss. Furthermore, the product suffers from a very rapid deterioration and after only a few days it is almost in an unsaleable state.

By using micro perforated film wrapped punnets, extended sell-by dates can be obtained reducing problems of supply in bad weather and reducing waste by retailers having excess product on the shelves in an unsaleable condition.

be less micro perforations than for the same amount of product stored at a higher temperature. By reducing respiration and the number of micro perforations per container, ripening will be retarded even further.

The present invention is particularly suitable for the handling of tomatoes, both home produced and foreign. In the latter case, foreign tomatoes can be transported by ship rather than expensive air freight.

5 Containers in accordance with the present invention are believed to be beneficial for all produce including fruits, vegetables and other fresh produce.

The present invention will be further illustrated with reference to the accompanying drawings in which various containers in accordance with the present invention are shown in schematic form.

10 Fig. 1 illustrates a flow pack such as would be produced upon a horizontal form machine made totally from semi-rigid or flexible film on one reel fed into a machine and formed, filled and sealed along three sides.

Fig.1A shows a container which is produced by a vertical form machine, wherein the product is placed in a 'bag' or container made by the packing machine from a reel of flexible film and sealed along one side and top and bottom of pack.

15 Fig. 2 shows a container wherein the product is placed in a small shallow tray and the machine forms one reel of film around the pack to give the same effect as the container of Fig. 1. However, the Fig. 2 arrangement results in a more rigid pack being obtained and film of thinner gauge can be used.

The film in each case is supplied with the precise number of micro perforations to give each pack and/or product the required atmosphere for delayed ripening.

20 In each case shown it may be required to hold the product/pack to a low temperature of say eight degrees centigrade whilst it is in store and being transported, when the pack is displayed it will be at a temperature somewhat higher, say twenty degrees centigrade. In this case extra micro perforations would be placed in the reel of film and covered with a self adhesive tape, tab or label; these would remain covered until the product/pack was put on display at the higher temperature when the tape, tab or label would be removed to allow the extra gas exchange required by the products increased respiration.

25 Fig. 3 illustrates a plastic punnet having a close fitting plastic lid with micro perforations in the lid. It is also possible to have micro perforations in the side of the container but this would give at best variable results as the produce may block certain of the holes.

Fig. 4A shows a plastic punnet and Fig. 4B a deep tray formed of expanded polystyrene, being 30 totally overwrapped with stretch film, in each case the film is micro perforated.

Fig. 5 shows a large polyethylene box bag containing a number of trays of produce. Micro perforations are provided as illustrated in the side and top which control the internal atmosphere. The box bag stands upon a standard 48 inch x 48 inch pallet.

35 It is possible to use half and quarter size box bags particularly for produce which is required to be used, packed or sold in smaller quantities than full pallet lots. It is thus believed that the present invention provides a new arrangement for the encasement of fresh produce to delay the ripening thereof.

40 It is also within the scope of the present invention to replace the micro perforations by one, two or more larger holes, the surface area of such larger hole(s) being the same as the total surface area of the micro perforations to be replaced. It is to be understood that the number of larger holes will depend upon details of the produce, its variety and the temperature as in the case of micro perforations.

Also according to an embodiment of the present invention there is provided a micro perforated plastics material bag, sack or pack. When such bag, sack or pack is placed over fresh produce located upon a pallet, then the atmosphere within the bag, sack or pack can be controlled as desired, thereby keeping deterioration to a minimum.

45 In use, the bags, stacks or packs can be micro perforated either before or after being applied to the product covered on the pallet.

Depending upon the nature of the material to be packed and the various parameters considered which will affect deterioration of the product, a suitably micro perforated bag, sack or pack would be applied over the produce located on the pallet. If desired the open end of the bag can be sealed by appropriate shrink 50 wrapping of the end region of the bag, sack or pack.

To enclose a pallet sized area of produce trays with an encasement which will provide a means to allow the produce or fruits to successfully modify the internal atmosphere to retard the ripening of said produce or fruit.

55 A large sheet of suitably heavy gauge plastic material, preferred is polyethylene, is first placed upon the pallet, produce trays are stacked two high on top of the plastics sheet, the sheet is then turned up on all four sides and the edges captured by the next row of produce trays being stacked upon it, trapping it in place.

When the pallet has been stacked with produce trays to the desired height, a large flat plastics sheet of

8. A plastics material stretch film as claimed in claim 7, characterised in that said film is formed of polyvinyl chloride (PVC).

9. A microperforated stretch film as claimed in claim 7 or 8, characterised in that the arrangement number of lines/distance lines apart (mm)/pitch of pins(mm)/size of holes (mm) utilised are as follows:

11/25/50/60,
05/20/30/60,
01/00/50/20, or
03/25/50/20

10. A container, bag or encasement as claimed in any one of claims 3 to 6, or a stretch film as claimed in any one of claims 7 to 10, characterised in that the microperforations are replaced by one or more larger holes, the surface area of such larger hole(s) being the same as the total surface area of the microperforations to be replaced.

11. A container, bag or encasement as claimed in any one of claims 1 to 6, characterised in that said container, bag or encasement is formed of foil coated or plastic metallised bags, sacks or packs for use in locations of high temperature.

12. A container, bag or encasement as claimed in any one of claims 1 to 6, 10 and 11, characterised in that the number and/or size of the openings can be reduced by application of self adhesive waterproof tape or the number can be increased by provision of a tear-off tab or tape.

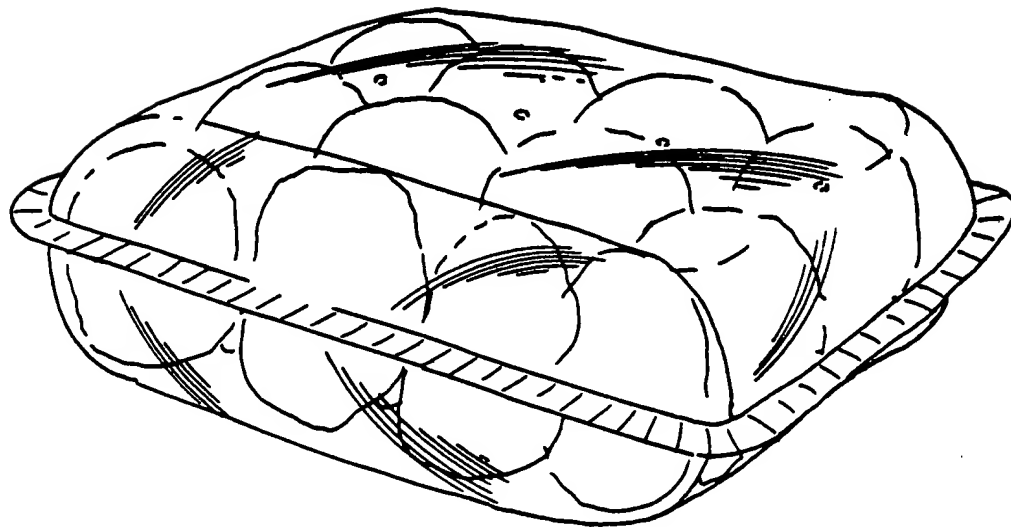


FIG. 1

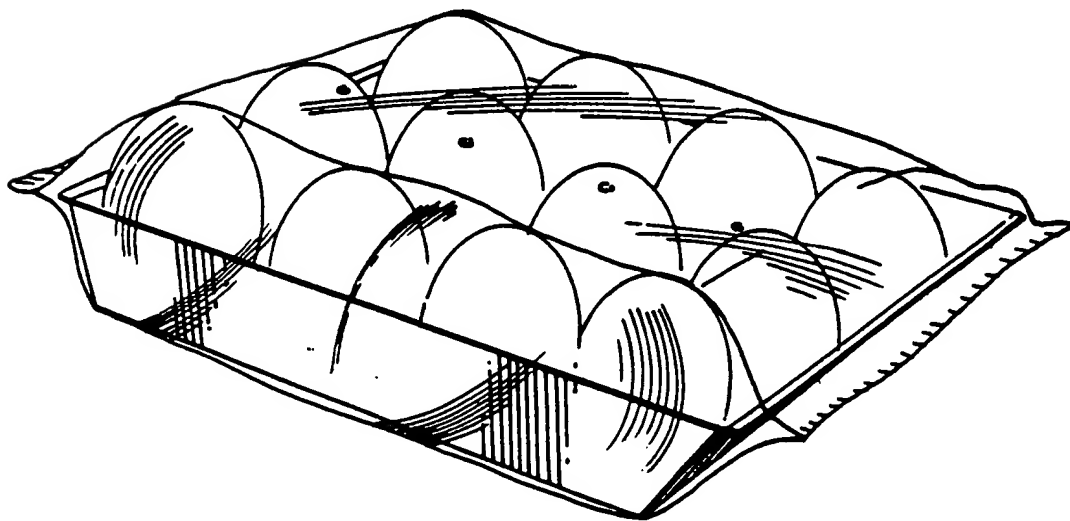


FIG. 2

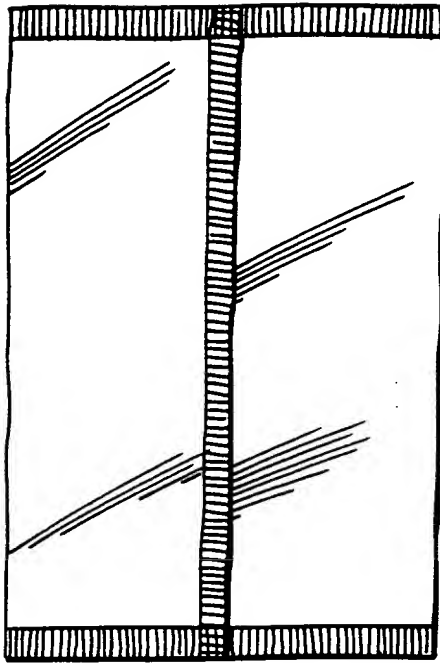


FIG.1A

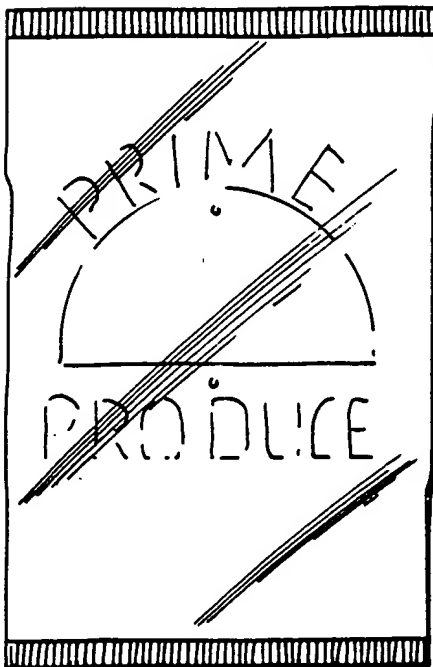


FIG.3

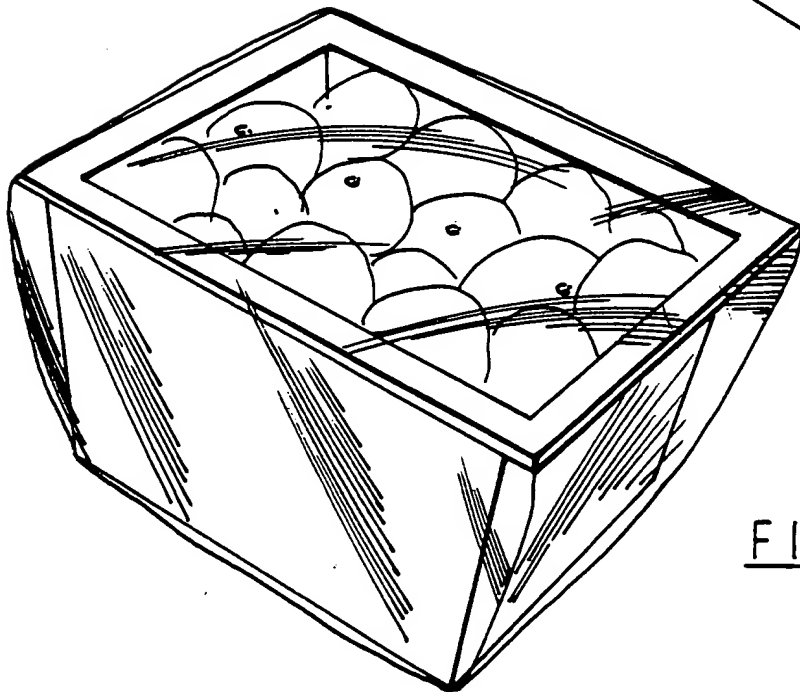
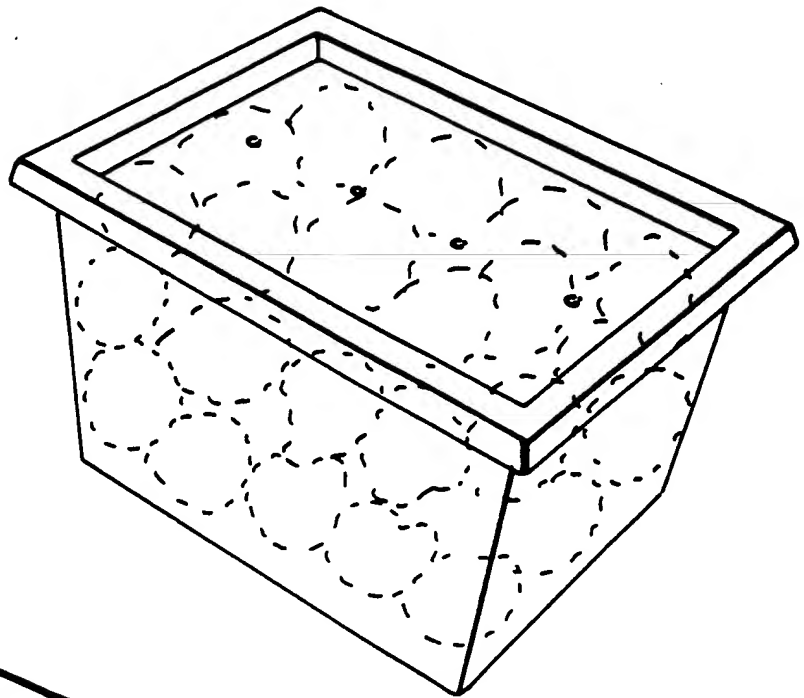


FIG.4A

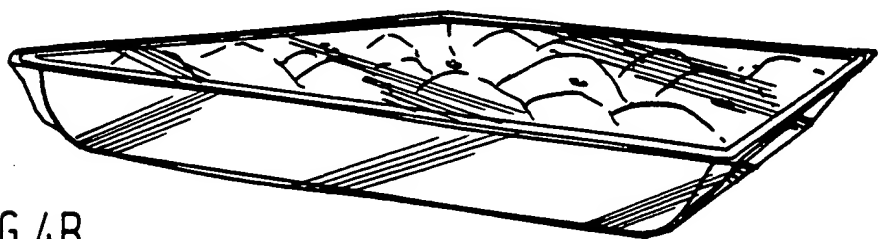


FIG.4B

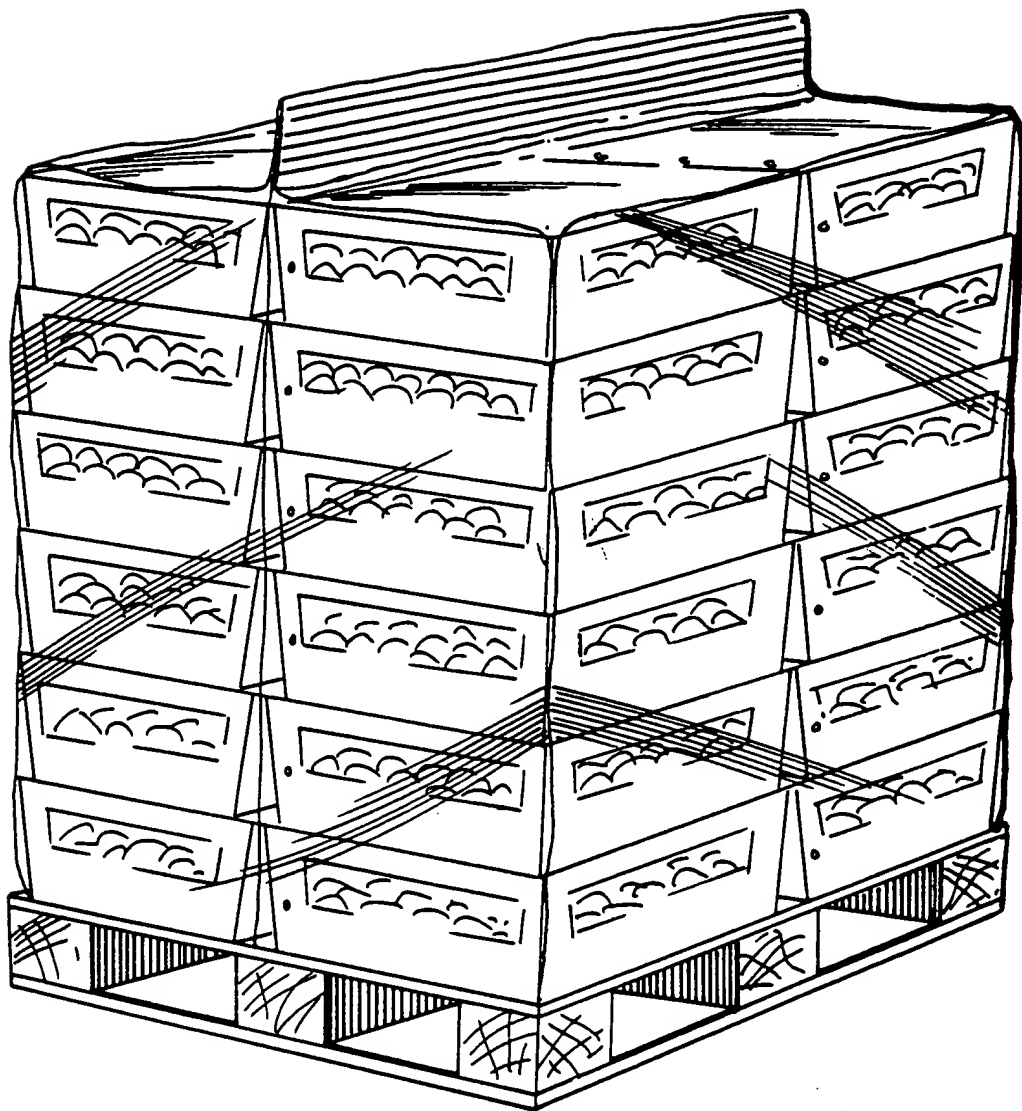


FIG. 5



DOCUMENTS CONSIDERED TO BE RELEVANT			EP 88301303.9
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	US - A - 3 097 787 (SCHUR) * Totality; especially column 1, lines 49-53; column 3, line 44; claim 6 * --	1,2,3,5,7,8	B 65 D 30/02 B 65 D 85/34 B 65 D 81/24
X	EP - A1 - 0 155 035 (WAVIN B.V.) * Totality * --	1,3	
X	US - A - 3 245 606 (CRANE) * Totality; especially fig. 1; column 2, line 69 * --	1,2,4,7	
X	US - A - 3 040 966 (CRANE) * Totality * --	1	
X	GB - A - 2 141 688 (BRAYFORD PLASTICS LIMITED) * Totality * --	1,10	TECHNICAL FIELDS SEARCHED (Int. Cl.4) B 65 D 30/00 B 65 D 33/00 B 65 D 81/00 B 65 D 85/00
X	US - A - 4 503 561 (BRUNO) * Totality; especially fig. 1 * --	1	
X	GB - A - 1 269 025 (STANDUN, INC.) * Totality; especially fig. 2 * ----	1	
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 30-12-1988	Examiner CZUBA
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			